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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,714	09/18/2003	Stephen W. Bedell	YOR920030478US1 (17032)	4400
23389	7590	03/30/2004	EXAMINER	
SCULLY SCOTT MURPHY & PRESSER, PC 400 GARDEN CITY PLAZA GARDEN CITY, NY 11530			GARCIA, JOANNIE A	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 03/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/664,714	Applicant(s) BEDELL ET AL.	
	Examiner Joannie A Garcia	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

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The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 1-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "amorphized region" in line 5. There is insufficient antecedent basis for this limitation in the claim.

In claim 3, line 2, "comprising" before "a Si layer", should be replaced with comprises.

In claim 6, line 2, "Si" after "group consisting of Si", should be deleted.

The term "energetic" in claims 7-8, 30, and 31, is a relative term, which renders the claim indefinite. The term "energetic" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If applicant intends particular ions, it should be clearly recited.

In claim 29, line 1, "amorphizing" before "and thermally treating" should be replaced with --amorphizing--.

Claims 30 and 31 recite the limitation "amorphized defective semiconductor crystal material" in lines 5 and 6, respectively. There is insufficient antecedent basis for this limitation in the claim.

Claims 30 and 31 recite the limitation "amorphized region" in lines 6 and 7, respectively. There is insufficient antecedent basis for this limitation in the claim.

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 2, 6, 7, 8, 10, 17-20, 27, and 30 are rejected under 35 U.S.C. 102(a) as being anticipated by Moriyasu et al (U.S. Patent 6,528,387).

Moriyasu et al discloses amorphizing, partially or completely, a region of a defective semiconductor crystal material by implanting ions into a region of said defective semiconductor crystal material (Column 38, lines 15-21), and annealing at 800 °C an amorphized region to recrystallize said partially or completely amorphized region forming a recrystallized region that has a reduced defect density as compared to the defective semiconductor crystal material (Column 12, lines 34-37, and Column 38, lines 21-23, and 27-28).

Regarding claim 2, Moriyasu et al discloses that the defective semiconductor crystal material is a heterostructure (Column 38, lines 15-17, and Column 39, lines 9-17).

Regarding claim 6, Moriyasu et al discloses that said defective semiconductor crystal material is silicon, or silicon-on-insulator (Abstract, Column 38, lines 15-17, and Column 39, lines 9-17).

Regarding claim 7, Moriyasu et al discloses amorphizing by using ions (Column 38, line 19-21).

Regarding claim 8, Moriyasu et al discloses amorphizing using Si ions (Column 38, lines 19-21).

Regarding claim 10, Moriyasu et al discloses amorphizing by implantation (Column 38, lines 19-21).

Regarding claim 17, Moriyasu et al discloses heating using an inert gas (Column 13, lines 60-65, and Column 15, lines 50-54).

Regarding claim 18, Moriyasu et al discloses that said inert gas comprises Ar or N₂ (Column 13, lines 60-65).

Regarding claim 19, Moriyasu et al discloses that said inert gas is diluted with an oxygen-containing gas (Column 13, lines 60-65).

Regarding claim 20, Moriyasu et al discloses heating is performed at a temperature of about 500 °C (Column 13, lines 53-54).

Regarding claim 27, Moriyasu et al discloses annealing at a targeted temperature of 800 °C (Column 13, lines 54-56).

Claims 3, 4, 9, 11, 15, 16, 21-24, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriyasu et al as applied to claims 1, 2, 6, 7, 8, 10, 17-20, 27, and 30 above, and further in view of Yu et al (U.S. Patent 6,689,671), Vasudev (4,617,066), and the following comments.

Moriyasu et al discloses that said defective semiconductor crystal material is silicon, or silicon-on-insulator (Abstract, Column 38, lines 15-17, and Column 39, lines 9-17), and amorphizing by using Si ions (Column 38, lines 19-21). Moriyasu et al does not teach that said defective semiconductor crystal material comprises a Si layer atop a SiGe layer, and amorphizing using Ge ions.

Yu et al discloses amorphizing by implanting using Si or Ge ions a region of a defective semiconductor crystal material, wherein said defective semiconductor crystal material comprises Si, silicon-on-insulator, or a tensilely strained Si layer atop a relaxed SiGe layer (Column 1, lines 30-37, and Column 8, lines 5-10), and thermally treating by an RTA process at 900 °C an amorphized region to recrystallize said amorphized region forming a recrystallized region that has a reduced defect density as compared to the defective semiconductor crystal material (Column 6, lines 65-67, and Column 7, lines 1-10). It would have been within the scope of one of ordinary skill in the art to combine the teachings of Moriyasu et al and Yu et al to enable the defective semiconductor crystal material amorphization step of Moriyasu et al to be performed.

Moriyasu et al discloses annealing an amorphized region to recrystallize said partially or completely amorphized region forming a recrystallized region that has a reduced defect density as compared to the defective semiconductor crystal material (Column 12, lines 34-37, and Column 38, lines 21-23, and 27-28). Moriyasu et al does not teach annealing using a furnace anneal. Vasudev discloses annealing at a temperature of 550 °C for about 30 minutes an amorphized region to recrystallize an amorphized region forming a recrystallized region that has a reduced defect density as compared to the defective semiconductor crystal material (Column 5, lines 31-33, Column 8, lines 30-37, and 40-43, Column 9, lines 27-42, and Column 12, lines 8-40). It would have been within the scope of one of ordinary skill in the art to combine the teachings of Moriyasu et al and Vasudev to enable the annealing step of Moriyasu et al to be performed.

Moriyasu et al discloses implanting ions into a region of said defective semiconductor crystal material (Column 38, lines 18-20), and annealing at 800 °C an amorphized region to

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recrystallize said partially or completely amorphized region forming a recrystallized region (Column 38, lines 21-23, and 27-28). Moriyasu et al does not disclose implanting at a temperature below 20 °C using a dose from about 10^{12} - 10^{16} atoms/cm², annealing for a time period of about 10 minutes or less, and forming said amorphized region to a depth from about 1 to 200 nm. It would have been a matter of routine optimization within the teachings of Moriyasu et al to determine suitable dose, time, temperature, and depth to achieve the recrystallization step.

Claims 5, 12-14, 25, 26, 28, and 29, would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956 until 2/4/04. See MPEP 203.08.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Joannie Adelle Garcia whose telephone number is (571) 272-1861. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax number for this group is 703-872-9306 for before final submissions, 703-872-9306 for after final submissions and the

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customer service number for group 2800 is (703) 872-9317. Updates can be found at

<http://www.uspto.gov/web/info/2800.htm>.



JAG

January 9, 2004

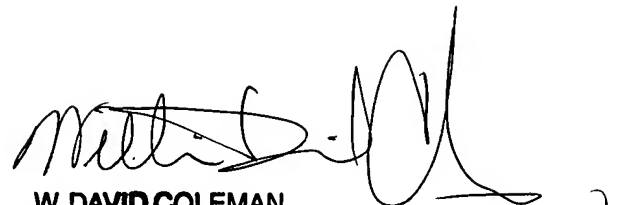
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